# New species of *Lepidosperma* (Cyperaceae) associated with banded ironstone in southern Western Australia

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## Abstract

Barrett, R.L. New species of *Lepidosperma* (Cyperaceae) associated with banded ironstone in southern Western Australia. *Nuytsia* 17: 37–60 (2007). Eight new species in the Australasian genus *Lepidosperma* Labill. are described from southern Western Australia. All of the taxa described here have restricted distributions in association with Banded Iron Formation (BIF) ranges and are potentially threatened by present or proposed mining activities. The following new species are described: *L. amansiferrum* R.L.Barrett, *L. bungalbin* R.L.Barrett, *L. diurnum* R.L.Barrett, *L. ferricola* R.L.Barrett, *L. ferriculmen* R.L.Barrett, *L. gibsonii* R.L.Barrett, *L. jacksonense* R.L.Barrett and *L. lyonsii* R.L.Barrett.

## Introduction

The taxonomy of the genus *Lepidosperma* Labill. in Western Australia has been poorly resolved for some time. Delimitation of species has been problematic, partly due to the high levels of homoplastic characters and, significantly, due to a paucity of good collections of many taxa. A revision of the genus is in preparation for the "Flora of Australia" treatment coordinated by K.L. Wilson. A number of new taxa associated with Banded Iron Formation (BIF) ranges are formally named here in advance of a full revision in order to highlight their conservation status and to promote further study of the group. The species within this genus appear to exhibit high levels of local endemism and habitat specificity, particularly in the arid-zone and South-western Interzone of Western Australia. All species described here are of restricted geographic and ecological distribution.

The genus *Lepidosperma* was last revised by Kükenthal (1941), with two additional species named for Western Australia by Blake (1949). Rye (1987) suggested that a number of potentially undescribed taxa could be recognised in the Perth region. This paper is the first in a series which will aim to review all Western Australian taxa and focuses on species associated with BIF. A second paper in this volume describes a new taxon from the Ravensthorpe region (Barrett 2007). It is anticipated that many more new taxa will be recognised in the genus, particularly in south-west Western Australia. Provision of a key to species must wait until sectional revisions can be completed. Comprehensive molecular studies of the genus are currently being undertaken by the author and collaborators, and these studies can be expected to greatly inform future classifications.

Conservation status in a poorly-known genus such as *Lepidosperma* can be difficult to accurately assess, given the paucity of collections available; often with few notes on population size or extent.

However, based on species which are better known and searched for (e.g. *L. gibsonii* R.L.Barrett and *L. ferricola* R.L.Barrett), and recent survey efforts on BIF ranges, it can be inferred that the few available collections of many of the taxa described here are likely to be a true indication of restricted distribution. Recent field observations of most taxa support this conclusion.

## Materials and methods

Descriptions are primarily based on herbarium specimens. Only five of the taxa described here have been observed in the field by the author and field observations of original collectors have been obtained, where possible, to supplement notes on herbarium sheets. All type specimens of *Lepidosperma* taxa at BM, CANB, K, MEL, NSW and PERTH have been examined. Herbarium acronyms follow Holmgren & Holmgren (1998–) except for RAV. which represents the Western Australian regional herbarium at Ravensthorpe. All specimens cited have been seen unless otherwise specified. Precise localities are withheld for Declared Rare and Priority species due to conservation concerns.

The distribution maps were created in DIVA-GIS freeware Version 5.2.0.2. (http://www.diva-gis.org) using coordinate data from PERTH collections. Interim Biogeographic Regionalisation for Australia (IBRA) Version 6.1 boundaries (Department of the Environment and Water Resources 2007) are shown.

Hodgon *et al.* (2006) have recently assessed the taxonomic utility of a large number of characters for the *L. laterale* R.Br. complex, many of which have been utilised in assessing the status of the new taxa described here. Measurements were made in the following manner. Size measurements of less than 15 cm were made using digital callipers certified accurate to 3/100$^{th}$ of a millimetre and rounded where appropriate. Measurements less than, or spanning, 1.5 mm are given to two decimal places. It is noted here that the number of available collections is relatively few for the taxa described herein and measurements outside the current known range can be expected.

Culms and leaves are all isobilateral and descriptions of shape refer to cross-section. The widest dimension (described as width but technically thickness) is given first, followed by the narrowest (described as thickness but technically width), with measurements taken at the midpoint of their length. Cross-section of the culms and leaves was also determined at the midpoint of their length. Culm and leaf height was measured from the base of the sheath, and culm height includes the inflorescence. The number of stomatal rows was counted by examination of epidermis patterns using a light microscope at 40 × magnification. The characteristics of young growth are recorded only if noted to differ from mature growth.

The angle of the spread of the culms and leaves (collectively grouped in ramets and often fan-like in appearance) is given to provide an indication of the growth habit of the plants. Angle of ramet/fan base was measured as the total angle between the two outermost leaves/culms on a single complete ramet/fan. This can be particularly diagnostic in taxa with distichous culms and leaves, less so in spirodistichous taxa. Distichous culms and leaves are arranged in two rows on opposite sides of the stem on the same plane while spirodistichous culms and leaves are arranged in two rows which spiral up the stem (Harden 1993), the latter often resulting in a more tightly clumping habit. Some species are very resinous at the base of the culms and leaves, and the resins may have colours and scents which are distinctive between different taxa. These characters have been included in descriptions where the information has been available. Notes on these features should be made at the time of collection as

scents generally change on drying and colour may intensify. When collecting specimens, entire ramets should be collected (including culm bases) as there are important diagnostic characters in the structure and arrangement of the bases of the ramets.

Inflorescence length was measured from the base of the involucral bract. Measurement of the lateral branches of the inflorescence was of the lowest lateral branch only and was inclusive of any further divisions of the lateral branch. As the glumes often tear and distort when flattened, glume width was measured as the broadest point of the fertile fruiting glumes in the curled position (shape is maintained in pressed material by the enclosed nut).

The style is either completely caducous, leaving only a scar, or with a short persistent basal portion remaining on the nut. Distinction is made here between the 'stylar cap' (previously described as the 'style base' by authors such as Wilson 1993, 1994) and the filiform basal portion of the style, which is persistent in some taxa. As recognised here, the stylar cap is an extension of the rib material described below which forms a ring around the base of the style, a character which varies in prominence with nut age. The stylar cap is variously a narrow band around the style (small) to a wide band covering most of the top of the nut (large). Nut length is inclusive of the attached hypogynous scales and nut width excludes the ribs (if present). The ribs appear as white bands overlaying the epidermis of the nut and the degree of ribbing on the nuts varies with age, so observations of mature nuts should be made. Ribs are usually very prominent on young nuts (unless absent). Hypogynous scales were described from mature nuts, their appearance differing at anthesis. The outline shape of the epidermal cells of the nut is potentially a useful taxonomic character and is to be explored further.

## Taxonomy

**Lepidosperma amansiferrum** R.L.Barrett, *sp. nov.*

*Lepidospermati brunoniano* Nees similis, sed culmorum indumento pilis longioribus fasciculatis reseniferis carenti; culmis tenuibus et complanatis, differt.

*Typus*: South Ironcap, Western Australia [precise locality withheld for conservation purposes], 7 September 1996, *N. Gibson & K. Brown* 2509 (*holo*: PERTH 05285321; *iso*: CANB, NSW).

*Lepidosperma* sp. Goldfields Ranges (N. Gibson & K. Brown 3175), Western Australian Herbarium, in FloraBase, http://florabase.dec.wa.gov.au [accessed 2 August 2007].

*Tufted perennial* with short rhizomes. *Culms* and *leaves* distichous; leaf to culm ratio 0.6–0.8:1; angle of fan (ramet) spread 14–25°. *Leaves* rigid, erect, ± flat to slightly biconvex, finely striate, yellow-green, not glaucous, with 24–28 stomatal rows per face, 15.5–42.0 cm tall, 1.12–1.65 mm wide, 0.21–0.26 mm thick; margins red, with a continuous band of short hairs and usually completely covered in reddish-brown resin; sheath dark brown, glabrous, base somewhat fibrous, with small amounts of red resin. *Culms* as for leaves but less prominently striate, with 14–22 stomatal rows per face, 25–54 cm tall, 0.99–1.42 mm wide, 0.27–0.33 mm thick. *Inflorescence* loose-lanceolate in outline, 37–89 mm long, 5–10 mm wide, with few lateral branches, 1 lateral branch per node; basal lateral branch 18–35 mm long with 6–13 spikelets; involucral bract 20–46 mm long. *Spikelets* 3.2–4.2 mm long, the upper flower bisexual, the lower flower functionally male. *Glumes* 6, with opaque pale margins grading to a reddish-brown keel, the surface with a few short hairs near the apex, which is acute to acuminate; 4 sterile glumes; fertile

glumes 2.8–3.8 mm long, *c.* 1.6 mm wide. *Stamens* 3; anthers 1.6–2.0 mm long including the apical appendage, *c.* 0.21 mm wide; filaments 1.9–3.2 mm long. *Style* 3-fid, *c.* 1.6 mm to branches which are 0.89–1.68 mm long; style base continuous with ovary, a short portion remaining on the nut; stylar cap small. *Nut* brown, becoming white with age, smooth, with 3 ribs, ovate in outline, terete in section, 1.9–2.3 mm long, 1.05–1.08 mm wide; epidermal cells narrowly oblong to almost linear in outline. *Hypogynous scales* 6, falling with the nut, narrowly triangular, white, 0.86–1.09 mm long; apex acuminate with a tuft of bristle-like hairs. (Figures 1, 2A)

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld] 1 July 2007, *R.L. Barrett & M. Wallace* RLB 4112 (AD, BM, BRI, CANB, HO, K, MEL, NE, NSW, PERTH, RAV.); 7 Sept. 1996, *N. Gibson & K. Brown* 3175 (PERTH); 7 Sept. 1996, *N. Gibson & K. Brown* 3176 (NE, PERTH).

*Distribution and habitat.* Only known from a very discrete area on and around South Ironcap in the southern Mallee District (Figure 3A). Grows on gentle lower slopes on yellow sandy loam soils with banded ironstone gravel and rocks. Occurs in low mallee woodland of *Eucalyptus livida*, *E. phaenophylla* subsp. *interjacens* and *E. rugulata* over *Acacia heterochroa* subsp. *robertii*, *A. lasiocalyx*, *Adenanthos argyreus*, *Allocasuarina campestris*, *Aluta appressa*, *Banksia sphaerocarpa* var. *dolichostyla*, *Callitris roei*, *Calothamnus quadrifidus*, *Dodonaea pinifolia*, *Drosera macrantha*, *Dryandra pallida*, *D. viscida*, *Euryomyrtus leptospermoides*, *Grevillea insignis* subsp. *elliotii*, *Hakea multilineata*, *Hibbertia axillibarba*, *H. exasperata*, *H. gracilipes*, *H. hemignosta*, *Isopogon gardneri*, *Lasiopetalum ferraricollinum*, *Leucopogon conostephioides*, *Leucopogon* sp. Ironcaps (N. Gibson & K. Brown 3070), *Lysinema ciliatum*, *Melaleuca cordata*, *Melaleuca pungens*, *Micromyrtus triptycha* subsp. *elata* ms, *Mirbelia dilatata*, *Petrophile glauca* and *P. stricta*, over *Boronia revoluta*, *Cryptandra intonsa*, *Dampiera angulata*, *Pterostylis sanguinea* and *P. sargentii*.

*Phenology.* Old flowers collected in July, fresh flowering not observed, expected to be late autumn. Mature seed recorded for September.

*Conservation status.* Recently listed as Priority One under Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora. Known only from a small area on South Ironcap over a range of about three kilometres. The population is very clearly defined by the outcropping of banded ironstone, resulting in a very restricted distribution. Recent surveys by the author and M. Wallace of Middle Ironcap, North Ironcap and the Bremer Range area failed to locate any further populations.

*Etymology.* From the Latin *amans* (loving) and *ferrum* (iron), in reference to this species occurring on iron rich soils.

*Notes.* Similar in appearance to *L. brunonianum* Nees; differing in the indumentum of the culms lacking clusters of longer resin-fused hairs, and in having slender, more compressed culms. There is at least one, probably several, unnamed related taxa between Cape Arid and Fitzgerald River. These specimens have a much more robust, lanceolate inflorescence with larger spikelets and thicker culms. A recently discovered taxon (unnamed and unrelated) occurring with *L. amansiferrum* on South Ironcap may be readily distinguished by the much taller culms (to 1.2 m), which are diamond-shaped in cross-section and lack resin-coated hairs on the culm and leaf margins.


Figure 1. Holotype of *Lepidosperma amansiferrum* (*N. Gibson & K. Brown* 2509; PERTH). Scale = 3 cm.


Figure 2. Macrophotograph of *Lepidosperma* culms. A – *L. amansiferrum* (*R.L. Barrett & M. Wallace* RLB 4112); B – *L. bungalbin* (*N. Gibson & M. Lyons* 3761); C, D – *L. diurnum* (*R.L. Barrett & M. Wallace* RLB 4124); E – *L. ferricola* (*C. MacPherson* 205 CM 99); F – *L. ferriculmen* (*R.L. Barrett & M. Wallace* RLB 4131); G – *L. gibsonii* (*R. Meissner & Y. Caruso* 3); H – *L. jacksonense* (*E. Mattiske* 180 - LM 373); I – *L. lyonsii* (*N. Gibson & M. Lyons* 2506). All specimens at PERTH. All scale bars = 1 mm.

**Lepidosperma bungalbin** R.L.Barrett, *sp. nov.*

Ab omnibus speciebus *Lepidospermum* Labill., culmis complanatis, subtiliter corrugato-striatis, nitidis, viridis, distinguiter.

*Typus*: Aurora Range, Western Australia [precise locality withheld for conservation purposes], 27 July 1995, *N. Gibson & M. Lyons* 3761 (*holo*: PERTH 05286867; *iso*: NSW).

*Lepidosperma* sp. Aurora Range (N. Gibson & M. Lyons 3761), Western Australian Herbarium, in FloraBase, http://florabase.dec.wa.gov.au [accessed 2 August 2007].

*Tufted perennial* with short rhizomes. *Culms* and *leaves* distichous; leaf to culm ratio 0.6–1:1; angle of fan (ramet) spread 14–30°. *Leaves* rigid, erect, almost flat, slightly convex-concave, finely ribbed (faces appearing corrugated/undulate), bright green, becoming yellow-green at base, not glaucous, with 44–71 stomatal rows per face, 23–64 cm tall, 2.3–4.9 mm wide, 0.17–0.35(–0.48) mm thick; margins green to cream, semi-transparent, smooth, not resinous; young leaves with small white hairs scattered on margin, quickly becoming reduced to small scabrid projections and usually absent from mature leaves, or reduced to a scar; sheath dark brown, glabrous, base entire to slightly fibrous, without resin or with small quantities at base of new growth; resin recorded as being fragrant. *Culms* as for leaves, with 41–49 stomatal rows per face, 40–65 cm tall, 3.1–4.5 mm wide, 0.36–0.56 mm thick. *Inflorescence* loose-linear in outline, 110–250 mm long, 8–22 mm wide, with several long branches, one lateral branch per node; basal lateral branch 48–125 mm long with 19–44 spikelets; involucral bract 24–84 mm long. *Spikelets* 4.3–5.6 mm long, the upper flower bisexual, the lower flower functionally male. *Glumes* 6, with opaque pale margins grading to rusty-brown keel, the surface with white hairs forming three lines on surface, plus some scattered towards margin, the apex acute to acuminate; 4 sterile glumes; fertile glumes 2.8–4.0 mm long, 0.89–1.31 mm wide. *Stamens* 3; anthers 3.1–3.4 mm long including the apical appendage, 0.39–0.50 mm wide; filaments 4.0–5.7 mm long. *Style* 3-fid, 2.0–3.0 mm to branches which are 2.0–3.2 mm long; style base continuous with ovary, caducous; stylar cap small. *Nut* pale brown, smooth, with 3 ribs, obovate in outline, terete in section, 2.3–2.6 mm long, 1.12–1.30 mm wide; epidermal cells ovate-oblong in outline. *Hypogynous scales* 6, falling with the nut, broadly triangular, white, 0.55–0.76 mm long; apex acuminate, with hairs. (Figures 4, 2B)

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld] 18 Nov. 2006, *G. Cockerton & S. McNee* LCS 12847 (CANB, NE, PERTH); 20 Nov. 2006, *G. Cockerton & S. McNee* LCS 12848 (PERTH); 25 July 1995, *N. Gibson & M. Lyons* 3760 (NSW, PERTH); 15 Oct. 2006, *S. McNee & B. Eckermann* LCS 12849 (MEL, NSW, PERTH).

*Distribution and habitat.* Known only from the Helena and Aurora Range in the Coolgardie District (Figure 3B). Steep mid-slopes on red loam soils with banded ironstone rock (massive in places) and gravel. Recorded from *Eucalyptus capillosa* subsp. *capillosa* and *E. horistes* low woodland over *Acacia* sp. Bungalbin Hill (J.J. Alford 1119), *Allocasuarina acutivalvis*, *Alyxia buxifolia*, *Calycopeplus paucifolius*, *Dryandra arborea*, *Eremophila oppositifolia*, *Exocarpos aphyllus*, *Grevillea zygoloba*, *Leucopogon* sp. Clyde Hill (M.A. Burgman 1207), *Melaleuca hamata*, *M. leiocarpa*, *M. nematophylla*, *Mirbelia* sp. Helena & Aurora (B.J. Lepschi 2003), *Olearia muelleri*, *Stenanthemum newbeyi*, *Trymalium myrtillus* and *Westringia cephalantha* over *Austrodanthonia caespitosa*, *Blennospora drummondii*, *Caladenia incrassata*, *Chamaexeros macranthera*, *Comesperma integerrimum*, *Conostylis argentea*, *Drosera macrantha* subsp. *macrantha*, *Neurachne annularis*, *Plantago* aff. *hispida*, *Pterostylis* aff. *rufa* and *Trachymene ornata*.

*Phenology.* Flowering recorded for July. Mature seed recorded for November.

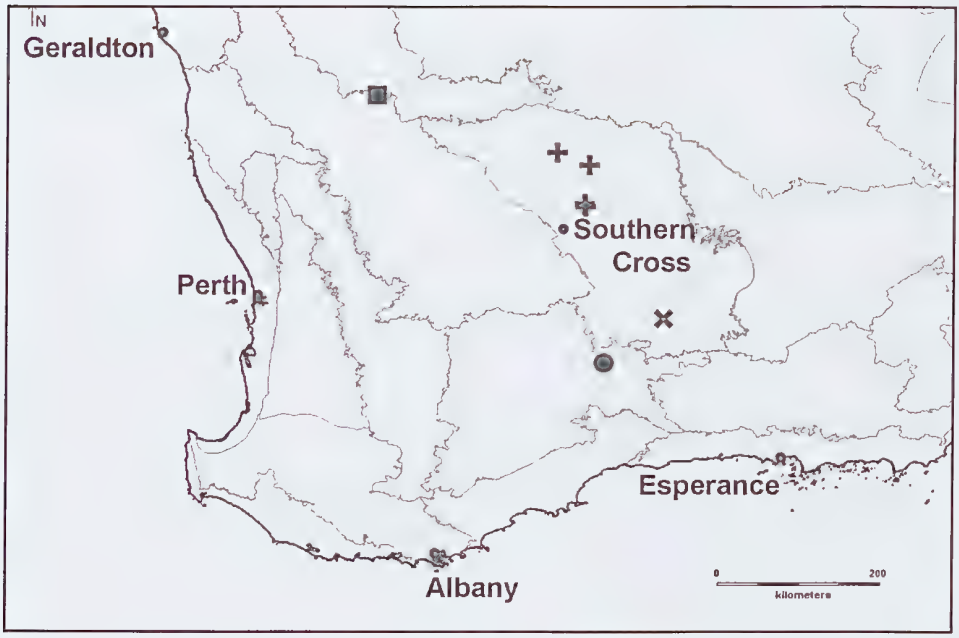


Figure 3A. Distribution of *Lepidosperma amansiferrum* (●), *L. diurnum* (×), *L. ferricola* (+) and *L. gibsonii* (■) in south-west Western Australia.

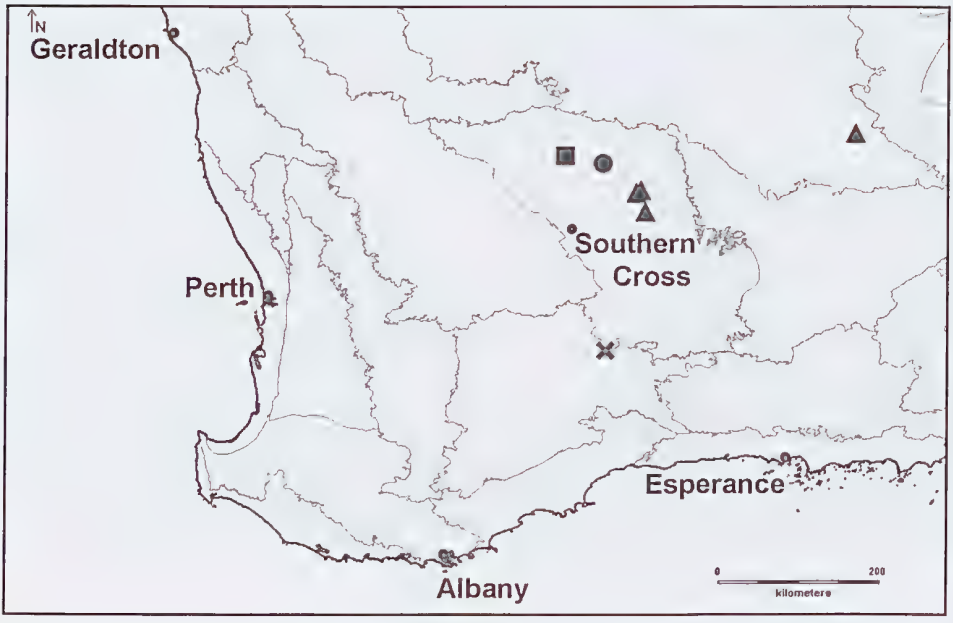


Figure 3B. Distribution of *Lepidosperma bungalbin* (●), *L. ferriculmen* (×), *L. jacksonense* (■) and *L. lyonsii* (▲) in south-west Western Australia.

*Conservation status*. Recently listed as Priority One under DEC Conservation Codes for Western Australian Flora. Known only from a single range subject to mining interests.

*Etymology*. From the location of this species near Bungalbin Hill. *Bungalbin* is here used as a noun in apposition.

*Notes*. *Lepidosperma bungalbin* grows near, but apparently not with, *L. ferricola* in the Helena and Aurora Range.

Distinguished from all other species by the finely ribbed (appearing corrugated) flat, glossy green culms (Figure 2B). A collection from a BIF hill near the Parker Range (*N. Gibson & M. Lyons* 2094, PERTH) is superficially similar to *Lepidosperma bungalbin*, though differing significantly in External Transcribed Spacer (ETS) sequence (Barrett *et al.* in prep.). The specimen, however, is infected with a smut fungus, distorting the inflorescence features and making accurate placement impossible. This taxon has recently been recollected by the author and is morphologically distinct from *L. bungalbin*, lacking the ribbing characteristic of that species, and is currently only known to occur in the vicinity of the Parker Range. A single collection from a BIF on Mt Finnerty, SE of Bungalbin Hill (*S. McNee* MtPh 039, PERTH) probably represents a new related taxon distinguished by the scabrous margins on the leaves and culms, however, further collections are required to determine the extent of variation in this taxon before it can be formally named.

**Lepidosperma diurnum** R.L.Barrett, *sp. nov.*

*Lepidospermati viscido* R.Br. similis, sed culmorum pilis antrorsis ad patentibus, dispersis ad densis, resina tectis, differt.

*Typus*: near Mount Day, west of Norseman, Western Australia [precise locality withheld for conservation purposes], 3 November 1979, *K.R. Newbey* 6246 (*holo*: PERTH 01200046; *iso*: AD, BRI, CBG, K, MEL, PERTH).

*Tufted perennial* with short rhizomes. *Culms* and *leaves* distichous; leaf to culm ratio 0.5–0.7:1; angle of fan (ramet) spread 20–25°. *Leaves* rigid, erect, compressed, ± flat to slightly biconvex to convex-concave, finely striate, green, not glaucous, with 12–36 stomatal rows, 32–52 cm tall, 2.6–5.8 mm wide, 0.42–0.68 mm thick; margins red, with scattered to dense, white, antrorsely curved to spreading hairs, often totally covered by pale orange resin forming a continuous margin covering a band of semi-translucent marginal cells on the culms (the leaf margin can appear to be slightly scabrous if the resin is interrupted along the culm, but is not strictly so as the margin is smooth, apart from hairs, below the resin); sheath brown, glabrous, base not fibrous, with yellow resin which is pineapple-scented when fresh. *Culms* as for leaves, with 41–46 stomatal rows, 57–71 cm tall, 3.9–5.0 mm wide, 0.91–0.94 mm thick. *Inflorescence* narrowly lanceolate in outline, 155–215 mm long, 18–38 mm wide, with many small lateral branches, 1 (appearing 2) lateral branch(es) per node; basal lateral branch 74–95 mm long with 70–97 spikelets; involucral bract 42–67 mm long. *Spikelets* 3.8–4.5 mm long, the upper flower bisexual, the lower flower functionally male. *Glumes* 4–6, with opaque pale margins grading to a rust red keel, the surface with white hairs scattered around the keel, the apex acute; 2–4 sterile glumes; fertile glumes 3.0–3.3 mm long, 0.81–1.05 mm wide. *Stamens* 3; anthers 1.39–1.94 mm long including the apical appendage, 0.31–0.46 mm wide; filaments 2.4–2.7 mm long. *Style* 3-fid, 0.96–1.17 mm to branches which are 1.22–1.43 mm long; style base continuous with ovary, a short portion remaining on nut; stylar cap small. *Nut* pale brown, becoming pale brown to cream with age, smooth, obscurely 3-ribbed, oblong-obovate in outline, terete in section, 1.6–2.3 mm long, 0.85–1.03 mm wide; epidermal cells narrowly oblong in outline. *Hypogynous scales* 6, falling with the nut, narrowly triangular, white, 0.75–1.03 mm long; apex acuminate, without hairs. (Figures 5, 2C, D)

*Other specimens examined.* [localities withheld] 2 July 2007, *R.L. Barrett & M. Wallace* RLB 4124 (AD, BM, BRI, CANB, HO, K, MEL, NE, NSW, PERTH, RAV.); 2 July 2007, *R.L. Barrett & M. Wallace* RLB 4125 (CANB, MEL, NE, NSW, PERTH).

*Distribution and habitat.* Known only from near Mt Day in the Bremer Range area, Mallee District (Figure 3A). Growing in *Allocasuarina campestris* thicket with mixed *Acacia andrewsii*, *A. warramaba*, *Calothamnus quadrifidus*, *Calytrix leschenaultii*, *Cryptandra graniticola*, *Dodonaea ptarmicaefolia*, *Eremophila gibbosa*, *Leptospermum fastigiatum*, *Melaleuca hamata*, *Phebalium elegans*, *Pimelea spiculigera* var. *thesioides*, *Scaevola oxyclona*, and *Senna artemisioides* subsp. *filifolia* over *Aristida contorta*, *Austrostipa* sp., *Triodia* sp. and *Drosera macrantha* on well drained stony loam with moderately exposed banded ironstone on hill-slopes. Relatively common in this habitat, but apparently specific to it.

*Phenology.* Fresh flowers recorded for July. Mature seed recorded for November.

*Conservation status.* Recently listed as Priority One under DEC Conservation Codes for Western Australian Flora. Known only from a single location over a distance of about ten kilometres. The area adjacent to Mt Day is subject to extensive active nickel mining and exploration activities.

*Etymology.* From the Latin *diurnus*, meaning 'belonging to the day' in reference to Mt Day, near the type location, and here used as a noun in apposition.

*Notes.* Similar in appearance to *Lepidosperma viscidum* R.Br., differing in having scattered to dense antrorse to spreading hairs on the culm margins; the hairs often being coated in resin. Distinctive from all named taxa in the nature of the hairs on the culm and leaf margins which are unusually long and fine, often with resin fusing groups of hairs into semi-discrete tufts, though not widely separated as in *L. tuberculatum* Nees and *L. viscidum* (Figure 2C, D). Additional specimens recently collected from the Ravensthorpe Range have a similar hair type, however further studies are required to determine whether they belong to the same taxon. Interestingly, while *L. diurnum* occurs on BIF ranges, the Ravensthorpe Range specimens occur on nickel-bearing rocky slopes.

**Lepidosperma ferricola** R.L.Barrett, *sp. nov.*

*Lepidospermati gibsonii* R.L. Barrett similis, sed culmis et foliis manifeste costato-subteretibus; seminibus majoribus, 1.7–2.4 mm longis, 0.84–1.14 mm latis; inflorescentia deminutissima, differt.

*Typus*: Koolyanobbing Range, Western Australia [precise locality withheld for conservation purposes], 23 September 2006, *G. O'Keefe, B. Eckermann & S. McNee* LCS 13854 (*holo*: PERTH 07542356; *iso*: CANB, NSW).

*Lepidosperma* sp. Mt Jackson (L. Mattiske 193-2/572), Western Australian Herbarium, in FloraBase, http://florabase.dec.wa.gov.au [accessed 2 August 2007].

*Tufted perennial* with short rhizomes. *Culms* and *leaves* spirodistichous; leaf to culm ratio 1:1; angle of fan (ramet) spread 5–10°. *Leaves* somewhat rigid, fully erect, somewhat angular and compressed or subterete, with 8 (occasionally 10) fine ribs, pale green to glaucous, with 36–48 stomatal rows, 32–105 cm tall, 0.47–0.61 mm wide, 0.42–0.53 mm thick; margins pale green, smooth, glabrous, not resinous; sheath pale tan with reddish tint, glabrous, base fibrous, not resinous. *Culms* as for leaves, but subterete, with (occasionally 8) 10 fine ribs, with 36–48 stomatal rows, 36–93 cm tall, 0.73–0.89 mm wide, 0.56–0.70 mm thick. *Inflorescence* loose-linear in outline, 24–93 mm long, 3.8–8.2 mm wide,


Figure 4. Holotype of *Lepidosperma bungalbin* (*N. Gibson & M. Lyons* 3761; PERTH). Scale = 3 cm.

spicately condensed, occasionally with one small lateral branch in basal nodes; basal lateral branch *c.* 5 mm long with 5–7 spikelets; involucral bract 9–118 mm long. *Spikelets* 3.6–5.2 mm long, the upper flower bisexual, the lower flower functionally male. *Glumes* 4–6, with opaque pale margins grading to rusty red keel, the surface with a few short capitate hairs on the surface, the margins glabrous, the apex acuminate, glabrous; 2–4 sterile glumes; fertile glumes 2.5–3.7 mm long, 0.83–1.38 mm wide. *Stamens* 3; anthers *c.* 2.8–2.9 mm long including the apical appendage, 0.24–0.28 mm wide; filaments 2.6–4.3 mm long. *Style* 3-fid, *c.* 2.1 mm to branches which are *c.* 3.4 mm long; style base continuous with ovary, a short portion remaining on nut; stylar cap small. *Nut* cream to pale brown, smooth with three suture lines (not obviously ribbed), unusually glossy, obovoid in outline, terete in section, 1.7–2.4 mm long, 0.84–1.14 mm wide; epidermal cells oblong in outline. *Hypogynous scales* 6–7, falling with the nut, narrowly triangular to almost linear, white, 0.82–1.31 mm long; apex acuminate, with minute bristle-like hairs. (Figures 6, 2E)

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld] 4 June 2003, *J. Bull s.n.* (PERTH 07304307); June 2003, *J. Bull s.n.* (PERTH 07304315); *G. Cockerton & S. McNee* LCS 13852 (PERTH); 5 Oct. 2006, *B. Eckermann & S. McNee* LCS 13853 (MEL, NE, PERTH); 31 Oct. 2000, *C. MacPherson* 205 CM 99 (PERTH); 6 Nov. 2000, *L. Mattiske* 193-2/572 (PERTH); 25 Sept. 1981, *K.R. Newbey* 9025 (PERTH); 22 Sept. 1981, *K.R. Newbey* 9197 (PERTH; 2 sheets).

*Distribution and habitat.* As circumscribed here, occurring on the Mt Jackson Range, Helena and Aurora Range and Koolyanobbing Range in the Coolgardie District where it is restricted to BIF (Figure 3A). Collection notes describe the habitat of this species as being on rocky ledges, scree slopes, crevices and ravines on banded ironstone with 'scrub' or low woodland of *Eucalyptus ravida* over *Acacia quadrimarginea*, *Allocasuarina eriochlamys*, *A. acutivalvis* subsp. *acutivalvis*, *Calycopeplus paucifolius*, *Dryandra arborea*, *Eremophila oppositifolia* subsp. *angustifolia* and *Grevillea zygoloba* over *Enchylaena tomentosa*, *Jacksonia jackson*, *Hibbertia exasperata*, *Melaleuca leiocarpa*, *Prostanthera althoferi* subsp. *althoferi* and *Stenanthemum newbeyi*.

*Phenology.* Fresh flowering not observed, expected to be late autumn. Mature seed recorded for September and October.

*Conservation status.* Listed as Priority One under DEC Conservation Codes for Western Australian Flora as *Lepidosperma* sp. Mt Jackson (L. Mattiske 193-2/572) (Atkins 2006). Known from several locations which are subject to active mining or exploration activities. Highly habitat specific and of localised occurrence.

*Etymology.* From the Latin *ferrum* (iron) and *-cola* (dwelling) in reference to this taxon occurring only on BIF ranges.

*Notes.* Similar in appearance to *Lepidosperma gibsonii* but differing in having distinctly ribbed subterete culms and leaves, larger seeds (1.7–2.4 mm long, 0.84–1.14 mm wide) and a very reduced inflorescence. Also similar in appearance to *L. leptophyllum* Benth. which was described by Bentham (1878) as having a recurved, reflexed or flexuose rachis above the first branch, and the hypogynous scales lacking bristle-like hairs. Lectotypification of *L. leptophyllum* is required, however, the primary specimen (*Drummond* 870, K) on which the name is based has glumes that are much thicker than those of *L. ferricola*, and culms that are not prominently ridged. *Lepidosperma leptophyllum* is probably more closely related to *L. costale* Nees, both species belonging to a difficult complex characterised by culms which are usually diamond-shaped in section and relatively slender inflorescences. *Lepidosperma ferricola* can be distinguished from all other taxa in the *L. costale* species complex by the prominently ridged culms and leaves (Figure 2E), and much reduced inflorescence. *Lepidosperma ferricola* occurs near, but not with, *L. bungalbin* in the


Figure 5. Holotype of *Lepidosperma diurnum* (*K.R. Newbey* 6246; PERTH). Scale = 3 cm.

Helena and Aurora Range, and may occur with *L. jacksonense* R.L.Barrett at Mt Jackson.

Populations from Mt Jackson, Bungalbin Hill and Koolyanobbing, here included in *L. ferricola*, show small differences (1–4 bp) in ETS sequence from each other (Barrett *et al.* in prep.). Population-level morphological and molecular studies may show that infraspecific taxa should be recognised, corresponding with biogeography. Additional populations with similar (but unique) ETS sequences have been found on 'Windarling Range', north of Windarling Peak (*G. O'Keefe, S. Regan & B. Eckermann* LCS 13851, PERTH), in the Die Hardy Range (*R.L. Barrett & J. Ujetz* RLB 2493 & RLB 2499, PERTH) and in the Mt Manning Range (*N. Gibson & B. Moyle* 3230, PERTH), all locations to the north and north-east of Mt Jackson. These populations are clearly recognisable by their thinner glumes, which are considerably larger in the Mt Manning population, and further research is required to determine whether these should be included within *L. ferricola* or recognised as discrete taxa.

**Lepidosperma ferriculmen** R.L.Barrett, *sp. nov.*

*Lepidospermati viscido* R.Br. similis, sed culmorum pilis seriebus continuis dispositis sine pilis longioribus fasciculatis; culmis gracilioribus, differt.

*Typus*: Middle Ironcap, Western Australia, 8 July 1979, *K.R. Newbey* 5232 (*holo*: PERTH 02309939).

*Lepidosperma* sp. Ironcap (K.R. Newbey 5233), Western Australian Herbarium, in FloraBase, http://florabase.dec.wa.gov.au [accessed 2 August 2007].

*Tufted perennial* with short rhizomes. *Culms* and *leaves* distichous; leaf to culm ratio 0.6–0.9:1; angle of fan (ramet) spread 25–45°. *Leaves* rigid, erect, flat to convex-concave, finely striate, green, not glaucous, with 72–95 stomatal rows, 16–38 cm tall, 3.6–7.4 mm wide, 0.32–0.73 mm thick; margin red, with a continuous marginal row of short white hairs variously covered by, or exceeding reddish-brown resin; sheath brown, becoming yellow above, glabrous, base not fibrous, not or slightly resinous. *Culms* as for leaves, erect, slightly biconvex to slightly convex-concave or almost flat, with 56–67 stomatal rows per face, 22–65 cm tall, 3.3–6.9 mm wide, 0.47–0.86 mm thick. *Inflorescence* lanceolate in outline, 80–175 mm long, 12–23 mm wide, with numerous short lateral branches, 1 lateral branch per node; basal lateral branch 37–70 mm long with 47–75 spikelets; involucral bract 39–66 mm long. *Spikelets* 3.8–5.0 mm long, the upper flower bisexual, the lower flower functionally male. *Glumes* 6, with opaque pale margins grading to red-brown keel, the surface with short white hairs in upper half towards centre, the apex acuminate; 4 sterile glumes; fertile glumes 3.7–4.3 mm long, 1.01–1.28 mm wide. *Stamens* 3; anthers 1.6–2.2 mm long including the apical appendage, 0.14–0.26 mm wide; filaments 2.9–3.2 mm long. *Style* 3-fid, 1.8–2.2 mm to branches which are 1.25–1.29 mm long; style base continuous with ovary, short portion remaining on nut; stylar cap large. *Nut* pale brown, smooth with 3 fine ribs, ovate in outline, terete in section, 2.4–2.8 mm long, 1.25–1.27 mm wide; epidermal cells oblong-obovoid in outline. *Hypogynous scales* 6, falling with the nut, broadly triangular, white, 0.88–1.16 mm long; apex acuminate, with a few small bristle-like hairs. (Figures 7, 2F)

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld] 3 July 2007, *R.L. Barrett & M. Wallace* RLB 4131 (AD, BM, BRI, CANB, HO, K, MEL, NE, NSW, PERTH, RAV.); 9 Sept. 1996, *N. Gibson & K. Brown* 3738 (PERTH); 9 Sept. 1996, *N. Gibson & K. Brown* 3739 (NSW, PERTH); 8 July 1979, *K.R. Newbey* 5233 (PERTH).

*Distribution and habitat.* Known only from a small area around Middle Ironcap in the Mallee District (Figure 3B). Grows in low open woodland of *Eucalyptus eremophila* and *E. phenax* over *Acacia lasiocalyx*, *A. sulcata* var. *platyphylla*, *Allocasuarina campestris*, *Astartea ambigua*, *Beyeria brevifolia*,


Figure 6. Holotype of *Lepidosperma ferricola* (*G. O'Keefe, B. Eckermann & S. McNee* LCS 13854; PERTH). Scale = 3 cm.

*Billardiera coriacea*, *Calothamnus quadrifidus*, *Cryptandra intonsa*, *Dodonaea pinifolia*, *Dryandra viscida*, *Gastrolobium floribundum*, *Gompholobium viscidulum*, *Grevillea insignis* subsp. *elliotii*, *Hakea multilineata*, *Hemigenia westringioides*, *Hibbertia lepidocalyx* subsp. *lepidocalyx*, *H. pungens*, *Labichea stellata*, *Leucopogon fimbriatus*, *Melaleuca pentagona*, *M. uncinata*, *Olearia muelleri*, *Phebalium filifolium* and *Phebalium tuberculosum* over *Caladenia paradoxa*, *Comesperma volubile*, *Cyanostegia lanceolata*, *Dampiera haematotricha* subsp. *dura*, *Ericksonella saccarata*, *Glischyrocaryon aureum* var. *angustifolium*, *Goodenia pinifolia*, *Pterostylis* aff. *aspera* and *Pterostylis mutica* on stony slopes, in well-drained orange-red sandy loam soils with banded ironstone gravel and rocks.

*Phenology*. Flowering recorded for July. Mature seed recorded for September.

*Conservation status*. Recently listed as Priority One under DEC Conservation Codes for Western Australian Flora. Known only from Middle Ironcap where it is restricted to the upper slopes over a distance of less than one kilometre.

*Etymology*. From the Latin *ferrum* (iron) and *culmen* (top, summit), in reference to the Ironcap Hill on which this species grows.

*Notes*. Superficially similar and possibly related to *L. viscidum*, differing in the continuous marginal row of short, even hairs and the slightly resinous culm margins (Figure 2F). The culms are very viscid and resinous with resin clusters in *L. viscidum s. str*. Specimens similar to *L. ferriculmen* have been collected from North Ironcap (e.g. *K.R. Newbey* 5212, PERTH) but genetic data (Barrett *et al.* in prep.) suggests that these collections represent a separate but related taxon, with further morphological studies being required to confirm this. Two putatively new taxa which are unnamed have recently been collected around the base of Middle Ironcap, but do not co-occur with *L. ferriculmen*. One taxon is easily distinguished in having a large, openly branched inflorescence, and the other is easily distinguished by having much narrower culms with relatively long hairs on the culm margins that are often coated in resin.

**Lepidosperma gibsonii** R.L.Barrett, *sp. nov.*

*Lepidospermati costali* Nees affinis, sed inflorescentiis gracilibus, culmis gracilibus teretibus, foliis gracilibus; planta semidormienti veneta, differt.

*Typus*: Mount Gibson Range, Yalgoo District, Western Australia [precise locality withheld for conservation purposes], 19 May 2006, *R.L. Barrett & M.D. Barrett* RLB 3345 (*holo*: PERTH 07543867; *iso*: AD, BM, CANB, K, MEL, NE, NSW).

*Lepidosperma* sp. Mt Gibson (R. Meissner & Y. Caruso 3), Western Australian Herbarium, in FloraBase, http://florabase.dec.wa.gov.au [accessed 2 August 2007].

*Tufted perennial* with short rhizomes. *Culms* and *leaves* spirodistichous; leaf to culm ratio 0.6–1:1; angle of fan (ramet) spread 5–10°. *Leaves* somewhat rigid, fully erect, angular, distinctly diamond-shaped in section, scarcely finely striate, deep green when fresh, pale green to glaucous when semi-dormant, with *c.* 30–34 stomatal rows, 35–45(–80) cm tall, 0.43–0.73 mm wide, 0.29–0.58 mm thick; margin pale green, smooth, glabrous, not resinous; sheath pale tan to brown, glabrous, base fibrous to almost entire, not resinous. *Culms* as for leaves but terete, scarcely finely striate, with *c.* 44 stomatal rows, 35–70(–140) cm tall, 0.32–0.72 mm wide, 0.32–0.63 mm thick. *Inflorescence* loose-linear in outline, 32–51 mm long, 2.5–5 mm wide, with few short lateral branches, 1 branch per node; lateral branches small, in line with main axis so as to appear simple, or basal lateral branch somewhat divergent, 10–18 mm long with 4–8 spikelets; involucral bract 10–39 mm long. *Spikelets* 2.6–3.2 mm long, the upper flower bisexual,


Figure 7. Holotype of *Lepidosperma ferriculmen* (*K.R. Newbey* 5232; PERTH). Scale = 3 cm.

the lower flower functionally male. *Glumes* 4 with opaque pale margins grading to rusty red keel, the surface with a few minute white hairs near the apex, the margins with scattered hairs, the apex acute to acuminate; 2 sterile glumes; fertile glumes 2.0–2.3 mm long, 0.94–1.24 mm wide. *Stamens* 3; anthers 1.6–2.0 mm long including the apical appendage, 0.25–0.38 mm wide; filaments 2.0–2.4 mm long. *Style* 3-fid, 1.29–1.33 mm to branches which are 1.30–1.56 mm long; style base continuous with ovary, caducous; stylar cap large. *Nut* cream, becoming mottled brown with age, smooth, with 3 prominent ribs, obovate in outline, terete in section, 1.25–1.40 mm long, 0.87–0.89 mm wide; epidermal cells ovate to sub-orbicular in outline. *Hypogynous scales* 6–8, falling with the nut, broadly triangular, white, 0.45–0.47 mm long; apex acuminate, with hairs. (Figures 8, 2G)

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld] 15 Sept. 2005, *R. Meissner & Y. Caruso* 2 (PERTH); 18 Sept. 2005, *R. Meissner & Y. Caruso* 3 (PERTH).

*Distribution and habitat.* Known only from the Mt Gibson Range in the Yalgoo District, on BIF ranges (Figure 3A). Grows in gullies and on slopes in shallow soil over massive banded ironstone, in shrub-heath communities of *Acacia acuaria*, *A. assimilis*, *A. stereophylla* var. *stereophylla*, *Allocasuarina acutivalvis* subsp. *prinsepiana*, *Anthocercis anisantha*, *Calycopeplus paucifolius*, *Darwinia masonii*, *Eremophila clarkei*, *Grevillea paradoxa*, *Hakea recurva*, *Hibbertia hypericoides*, *Melaleuca hamata*, *M. nematophylla*, *M. radula*, *Micromyrtus trudgenii*, *Pimelea avonensis* over *Amphipogon caricinus* var. *caricinus*, *Austrostipa hemipogon*, *Bromus arenarius*, *Cheilanthes adiantoides*, *Drosera macrantha*, *Erodium cygnorum*, *Lawrencella rosea*, *Schoenus nanus*, *Thysanotus manglesianus* and *Xanthosia bungei*.

*Phenology.* Flowering recorded for May and June. Mature seed recorded for September.

*Conservation status.* Listed as Declared Rare Flora under the Western Australian Wildlife Conservation Act 1950 as *Lepidosperma* sp. Mt Gibson (R. Meissner & Y. Caruso 3) (Atkins 2006). Restricted to a single range system, with a population size of about 25 000 plants; a proportion of these being threatened by development of an iron ore mine.

*Etymology.* The specific epithet honours DEC research scientist Neil Gibson who has made a number of important *Lepidosperma* collections while conducting extensive flora surveys in southern Western Australia. The name also refers to the type locality, Mt Gibson.

*Notes. Lepidosperma gibsonii* is strongly supported as a member of the *L. costale* species complex based on molecular data (Barrett *et al.* in prep.). It is the only taxon known in the complex that has terete culms (Figure 2G). The reduced inflorescence makes it superficially similar to *L. ferricola*, however it is easily distinguished from that taxon by examination of the culms (see notes under *L. ferricola*).

**Lepidosperma jacksonense** R.L.Barrett, *sp. nov.*

*Lepidospermati brunoniano* Nees similis, sed culmorum pilis seriebus continuis dispositis sine pilis longioribus fasciculatis; culmis longioribus, differt.

*Typus*: Mount Jackson, Western Australia, 4 November 2000, *E. Mattiske* 180 - LM 373 (*holo*: PERTH 06327893; *iso*: NSW).

*Lepidosperma* sp. Jackson Range (E. Mattiske 180 - LM 373), Western Australian Herbarium, in FloraBase, http://florabase.dec.wa.gov.au [accessed 2 August 2007].


Figure 8. Holotype of *Lepidosperma gibsonii* (*R.L. Barrett & M.D. Barrett* 3345; PERTH). Scale = 3 cm.

*Tufted perennial* with short rhizomes. *Culms* and *leaves* distichous; leaf to culm ratio 0.6–1.1:1; angle of fan (ramet) spread 10–25°. *Leaves* rigid, erect, biconvex or convex to almost flat, finely striate, yellow-green to green, paler at the base, not glaucous, with 18–21 stomatal rows per face, 23–67 cm tall, 1.2–2.3 mm wide, 0.43–0.66 mm thick; margin pale red, with fine white hairs coated in red resin (hairs entirely covered, or at the base only); sheath brown, glabrous, base fibrous, somewhat resinous. *Culms* as for leaves, biconvex, with 20–24 stomatal rows per face, 44–67 cm tall, 1.5–2.9 mm wide, 0.49–0.85 mm thick. *Inflorescence* lanceolate to ovate in outline, 69–195 mm long, 17–50 mm wide, with several spreading lateral branches which may be further divided, one lateral branch per node; basal lateral branch 30–93 mm long with 25–95 spikelets; involucral bract 22–46 mm long. *Spikelets* 3.5–4.3 mm long, the upper two flowers bisexual, fertile, the lower flower functionally male. *Glumes* 8, with opaque pale margins grading to rusty brown keel, the surface with fine white hairs spreading in various directions, the apex acuminate; 6 sterile glumes; fertile glumes 3.3–4.0 mm long, *c.* 1.2 mm wide. *Stamens* 3; anthers 1.7–1.9 mm long including the apical appendage, 0.25–0.36 mm wide; filaments 1.8–2.4 mm long. *Style* 3-fid, *c.* 2.5 mm to branches which are *c.* 2.0 mm long; style base continuous with ovary, a short portion remaining on nut; stylar cap small. *Nut* pale brown, smooth, with 3 fine ribs, obovate in outline, terete in section, 1.7–1.9 mm long, 1.01–1.08 mm wide; epidermal cells ovate-oblong in outline. *Hypogynous scales* 6–7, falling with the nut, narrowly triangular, with a broad base, white, 0.95–1.13 mm long; apex long-acuminate, with bristle-like hairs. (Figures 9, 2H)

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld] 27 Oct. 2006, *G. Cockerton* LCS 12771 (PERTH); 13 Nov. 2006, *G. Cockerton & S. McNee* LCS 12846 (PERTH); 25 Jan. 2007, *G. Cockerton & S. McNee* LCS 13843 (PERTH); 12 Feb. 2007, *S. McNee & B. Eckermann* LCS 13850 (PERTH).

*Distribution and habitat.* Jackson Range area, north of Southern Cross in the Coolgardie District (Figure 3B). Occurs on mid-slopes in silty, sandy loam with chert outcrops. Recorded in open *Allocasuarina acutivalvis* scrub in association with *Acacia quadrimarginea*, *A. eriochlamys*, *Aluta appressa*, *Baeckea elderiana*, *Hibbertia eatoniae*, *H. exasperata* and *Thryptomene kochii* over *Amphipogon caricinus*.

*Phenology.* Fresh flowering not observed, expected to be late autumn. Mature seed recorded for November.

*Conservation status.* Recently listed as Priority One under DEC Conservation Codes for Western Australian Flora. Known only from the Jackson Range in sites subject to mining activities.

*Etymology.* The epithet is derived from the location of the type collection; the Jackson Range.

*Notes.* Similar in appearance to *Lepidosperma brunonianum*, differing in having a continuous row of marginal hairs, without clusters of longer hairs, and taller culms. Also similar in appearance to *L. lyonsii* R.L.Barrett (see notes under that species).

**Lepidosperma lyonsii** R.L.Barrett, *sp. nov.*

*Lepidospermati jacksonensi* R.L.Barrett affinis, sed culmis pilis antrorsis, albis, dispersis, resiniferis tectis; glumis pilis clavatis, brevibus, differt.

*Typus*: north-east of Mount Finnerty, Jaurdi Station, Western Australia [precise locality withheld for conservation purposes], 20 September 1995, *N. Gibson & M. Lyons* 2506 (*holo*: PERTH 05293758; *iso*: NSW).

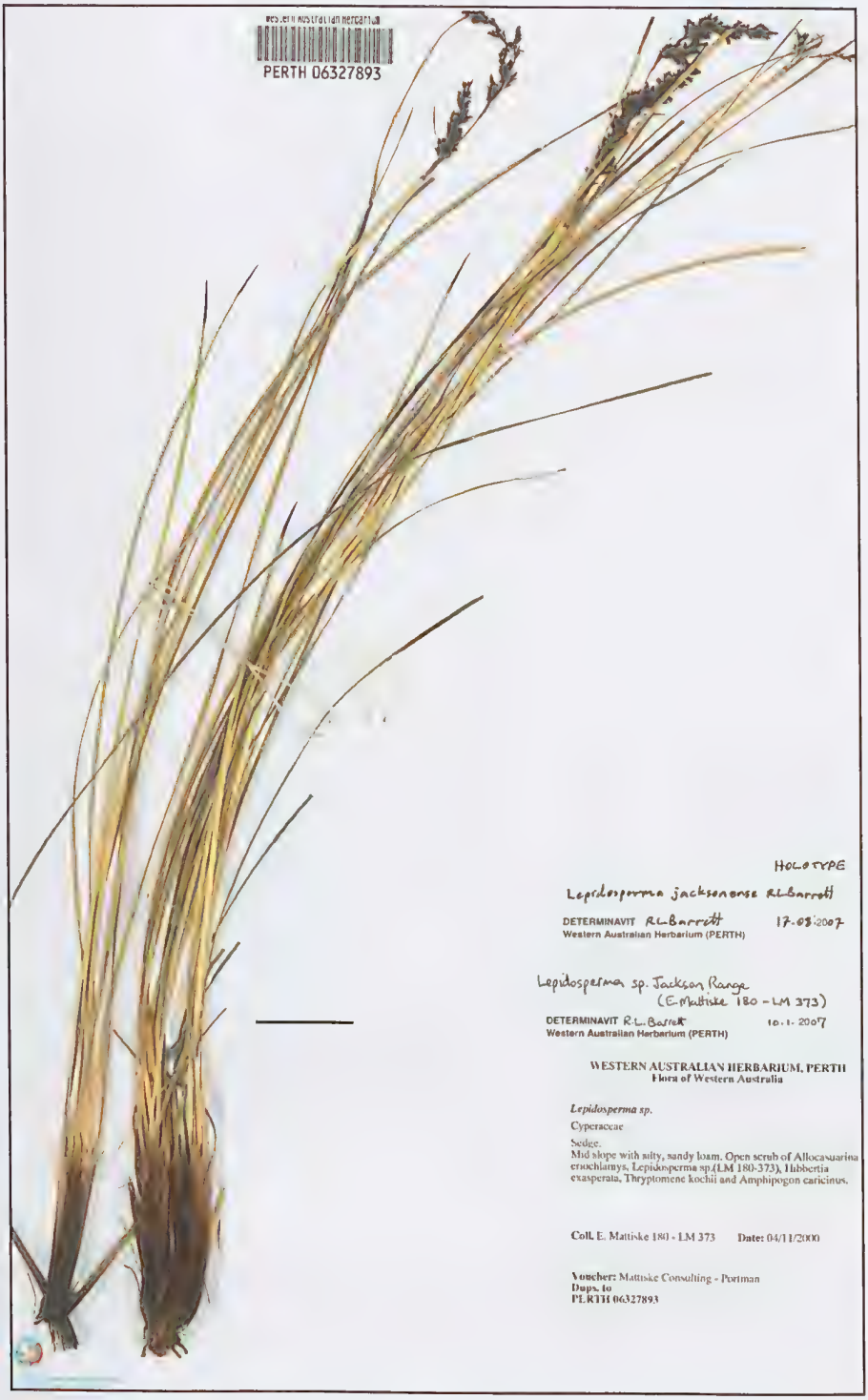


Figure 9. Holotype of *Lepidosperma jacksonense* (*E. Mattiske* 180 – LM 373; PERTH). Scale = 3cm.

*Lepidosperma* sp. Jaurdi (N. Gibson & M. Lyons 2506), Western Australian Herbarium, in FloraBase, http://florabase.dec.wa.gov.au [accessed 2 August 2007].

*Tufted perennial* with short rhizomes. *Culms* and *leaves* distichous; leaf to culm ratio 0.7–0.9:1; angle of fan (ramet) spread 15–20°. *Leaves* rigid, erect, biconvex, finely striate, green, becoming yellow at base, not glaucous, with 22–35 stomatal rows per face, 31–53 cm tall, 1.19–2.75 mm wide, 0.37–0.68 mm thick; margin red, with fine antrorsely curved white hairs, usually completely embedded in red resin, forming an almost continuous margin; sheath brown, glabrous, the base very fibrous, somewhat resinous. *Culms* as for leaves, with 21–33 stomatal rows per face, 43–60 cm tall, 1.6–2.4 mm wide, 0.53–0.68 mm thick. *Inflorescence* lanceolate in outline, 69–115 mm long, 12–26 mm wide, with few branches, 1 lateral branch per node; basal lateral branch 35–54 mm long with 33–67 spikelets; involucral bract 26–80 mm long. *Spikelets* 3.3–4.3 mm long, the upper flower bisexual, the lower flower functionally male. *Glumes* 6, with opaque pale margins grading to rusty red keel, the surface covered in very short (almost squamulose), white hairs, the margins sometimes with longer hairs, the apex acute to acuminate; 4 sterile glumes; fertile glumes 3.4–3.7 long, 0.72–1.35 mm wide. *Stamens* 3; anthers 1.8–2.1 mm long including the apical appendage, 0.33–0.41 mm wide; filaments 2.5–3.1 mm long. *Style* 3-fid, 1.7–2.1 mm to branches which are 1.4–1.9 mm long; style base continuous with ovary, a short portion remaining on nut; stylar cap short. *Nut* pale brown, becoming darker with age, smooth, with 3 ribs, obovate in outline, terete in section, 1.8–1.9 long, 1.14–1.21 mm wide; epidermal cells oblong-ovate in outline. *Hypogynous scales* 6, falling with the nut, broadly triangular, white, 0.67–0.97 mm long; apex acuminate, with hairs. (Figures 10, 2I)

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld] 14 Aug. 1981, *K.R. Newbey* 8516 (PERTH); 16 Sept. 1981, *K.R. Newbey* 9039 (PERTH); 6 Oct. 1999, *L.W. Sage* 1977 (PERTH).

*Distribution and habitat.* Known only from around Mt Finnerty, Mt Walter and Erayinia Hill near Karonie, all in the Coolgardie District (Figure 3B). Near Mt Finnerty it occurs on a gentle slope on pale orange sandy loam skeletal soils with banded ironstone gravel and rocks in *Allocasuarina acutivalvis* shrubland with *Acacia resinimarginea*, *Baeckea elderiana*, *Malleostemon tuberculatus*, *Melaleuca hamata* and *Mirbelia* sp. Helena & Aurora (B.J. Lepschi 2003) over *Lawrencella rosea*, *Sida atrovirens* and *Waitzia acuminata*. To the west of Mt Finnerty, it grows in *Eucalyptus rigens* and *E. rigidula* mallee woodland with *Acacia sibina*, *Amphipogon caricinus* var. *caricinus*, *Austrostipa scabra* subsp. *scabra*, *Baeckea elderiana*, *Calocephalus multiflorus*, *Grevillea paradoxa*, *Melaleuca hamata*, *Persoonia coriacea* and *Phebalium canaliculatum*. At Mt Walter, it grows in well-drained, stony loamy sand on a moderately exposed quartz hill in shrubland with *Acacia steedmanii*, *Allocasuarina campestris*, *Calothamnus gilesii*, *Dodonaea microzyga* var. *acrolobata*, *Granitites intangendus*, *Hibbertia glomerosa* var. *glomerosa*, *Prostranthera grylloana*, *Rhyncharrhena linearis*, *Stypandra glauca* and *Trachymene pilosa*. At Erayinia Hill it grows in well-drained, shallow, stony loamy sand on the upper slopes of a large quartz hill.

*Phenology.* Fresh flowering not observed, expected to be late autumn. Mature seed recorded for September and October.

*Conservation status.* Recently listed as Priority Three under DEC Conservation Codes for Western Australian Flora. Poorly known, but possibly more widespread than current collections suggest. Further surveys are required before an accurate conservation assessment can be made. Known only from a few locations and potentially threatened by proposed mining activities at some of these locations.

*Etymology.* Named in honour of DEC research scientist Michael Lyons, co-collector of specimens of this and other novel *Lepidosperma* species, and in recognition of his extensive flora conservation work.

*Notes.* Similar in appearance to *Lepidosperma jacksonense* but distinguished by the short clavate hairs


Figure 10. Holotype of *Lepidosperma lyonsii* (*N. Gibson & M. Lyons* 2506; PERTH). Scale = 3 cm.

on the glumes and by the antrorse white hairs on the culm margins (hairs also resin covered, Figure 10I). Both *L. jacksonense* and *L. lyonsii* can be distinguished from other taxa in the region by their relatively tall and slender culms and leaves, combined with shortly hairy margins.

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